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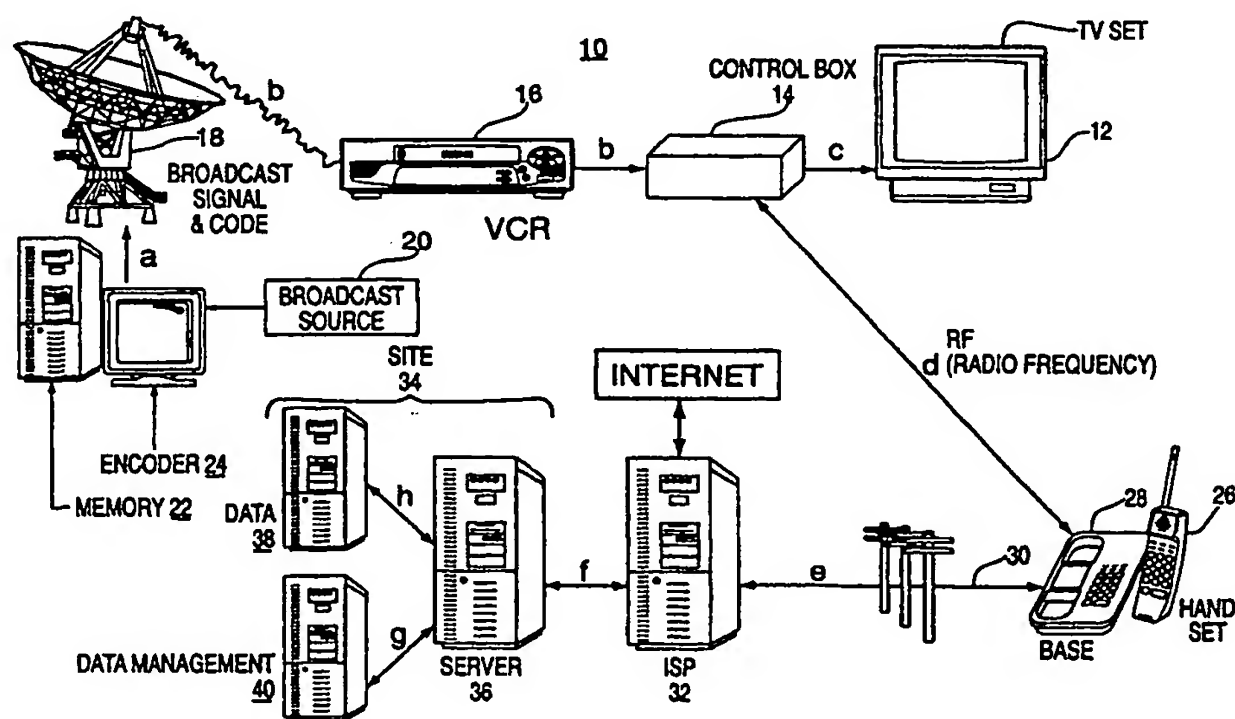
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>H04N 7/10, 7/01, 7/00, 5/44, H04H 1/00, 1/02, 7/00, H04M 11/00, G06F 17/60</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 00/44168</b> <b>(43) International Publication Date:</b> <b>27 July 2000 (27.07.00)</b>
<b>(21) International Application Number:</b> PCT/US98/22844 <b>(22) International Filing Date:</b> 19 January 1999 (19.01.99) <b>(71) Applicant (for all designated States except US):</b> KOPLAR INTERACTIVE SYSTEMS INTERNATIONAL [US/US]; 4935 Linsell Boulevard, Sr. Louis, MO 63108 (US). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> KOPLAR, Edward, J. [US/US]; 4935 Linsell Boulevard, Sr. Louis, MO 63108 (US). CIARDULLO, Daniel, Andrew [US/US]; 1386 Country Road 5480, Rolla, MO 65401 (US). <b>(74) Agent:</b> RACKMAN, Michael, I.; Gottlieb, Rackman & Reisman, P.C., 8th floor, 270 Madison Avenue, New York, NY 10016 (US).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** TELEPHONE HANDSET FOR USE IN INTERACTIVE TV SYSTEMS**(57) Abstract**

A television broadcast is transmitted with an additional signal indicative of additional information being available on an Internet site. Preferably the additional information is related to a TV program being broadcast. At a receiver station, a control box (16) is provided which is associated with a standard telephone set (26, 28). The telephone set provides standard telephone communication for a user or alternatively can be used to control access to the Internet site with the additional information and to retrieve said information for display on a standard TV set (12) together with the standard program. The telephone set is provided with additional keys with which this control can be achieved.

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## TELEPHONE HANDSET FOR USE IN INTERACTIVE TV SYSTEMS

This application claims priority to provisional application 60/063,307 filed October 28, 1997.

### 5 BACKGROUND OF THE INVENTION

#### A. Field of Invention

This invention pertains to a system in which a telephone is used for the dual purpose of standard telephone conversations and to control access and display of web pages and other  
10 information received on the Internet or other means on a standard TV set.

#### B. Description of the Prior Art

The advent of the Internet resulted in a wide variety of information becoming available at home, in the office or virtually anywhere via a standard telephone line. Moreover, this information is useful for business or entertainment, education or any other  
15 similar purposes and is available virtually instantaneously. A disadvantage of the standard Internet access means is that it still requires a laptop or a PC computer. While attempts have been made to provide Internet access on a standard TV set using special coupling boxes, these attempts were unsuccessful because they were cumbersome to use. Moreover, these boxes require yet another remote control for their operation. Thus, there is a need for an  
20 effective system for accessing the Internet which does not require yet another remote control and which is relatively simple and easy to use.

### OBJECTIVES AND SUMMARY OF THE INVENTION

An objective of the present invention is to provide a system which delivers easy  
25 access to the Internet or other graphical data using standard broadcasting channels.

A further objective is to provide an Internet access system in which the visible portion of the broadcast tv signals are used for information transfer to a remote location (i.e., the user) and a telephone connection is used to send requests by the user for the information.

A further objective is to provide a an Internet access system in which a modified,  
30 preferably wireless, telephone is used to provide the control for the Internet access.

Other objectives and advantages of the invention shall become apparent from the following description. Briefly, a standard TV program is broadcast over the airways, by satellite, cable or any other known means to several users. The program is broadcast using video signals which have imbedded therein an indication signal indicative of additional  
35 information being available. The indication signal is preferably included in the visible portion of the TV program. For example, the indication signal may include a web site address, said

web, with said additional information being available from said web site.

At a typical user site a receiver station includes a standard TV set, a control box and a telephone set. The control box intercepts the video signals and includes a detector for detecting said indication signal. When the indication signal is detected, the control box generates a display, preferably but not necessarily on the TV set, indicating the availability of the additional information.

The telephone set provides standard telephone communication and in addition also provides access to the Internet to allow the retrievals of said additional information from said Internet site. For this purpose, the telephone set is in communication (by an RF link, hard wired connection or other means) with the control box. When the Internet site address is received, the control box transmits it to the telephone set. The telephone set then activates a modem incorporated therein, accesses the Internet site, retrieves the information, and sends the same to the control box. The control box receives the additional information and sends it to the TV set to be displayed either along the standard TV program, or displacing the TV program.

The telephone set also has several additional selecting keys provided for the user. When the initial display is generated by the control box indicative of the availability of additional information, the user can activate an appropriate key on the telephone set requesting the additional information. The process for retrieving and displaying the additional information is then initiated. Other keys may be used as well to navigate on the Internet site.

Associated with the telephone set there may be other accessories such as a smart card reader to allow the user to charge certain goods or service offered by the Internet site, a printer for printing documents and so on.

Preferably the telephone set includes a base and a hand set in wireless communication with the base. The base then includes means for communicating with the hand set, means for communicating with the control box, a modem, and a controller for controlling the operation of the base and the hand set.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a somewhat schematic representation of a system constructed in accordance with this invention and the various interconnections between the components of the system;

Fig. 2 shows a front elevational view of a wireless telephone used for controlling the operation of the present invention;

Fig. 3 shows a rear elevational view of the wireless telephone of Fig. 2;

Fig.4 shows a block diagram of the telephone hand set of Figs. 2 and 3;

Fig. 5 shows an alternate embodiment for the wireless telephone of Figs. 2 and 3;

Fig. 6 shows a block diagram for the telephone base of the system of Fig. 1;

Fig. 7 shows a block diagram of the control box of the system of Fig. 1;

5 Fig. 8 shows a flow chart for the operation of the control box of Fig. 7;

Fig. 9 shows a flow chart of the operation of the base of Fig. 6; and

Fig. 10 shows a flow chart of the operation of the telephone hand set of Figs. 2 and 3.

#### DETAILED DESCRIPTION OF THE INVENTION

10 As shown in Fig. 1, a system 10 for providing Internet access in accordance with this invention, includes a TV set 12 receiving standard RF signals from a control box 14. Box 14 receives the RF signals from a VCR 16. Alternatively, instead of or in addition to the VCR, the system may include a cable decoder (not shown). Standard TV broadcasting signals are generated by a remote antenna 18 and are received by a tuner (not shown) in the VCR 16. If  
15 a cable decoder is used, this cable box receives the standard TV signals via a cable (not shown). During normal operation, control box 14 does not manipulate these RF signals but merely passes them through to the set 12. If neither a VCR 16, nor a cable decoder is used, the broadcast signals are received directly by control box 14. The user watches a normal TV program, on set 12.

20 The signal to the antenna 18 originates from a broadcast signal source 20. At certain predetermined times, or in conjunction with certain content of the specific program being produced by source 20, additional information is made available designating a specific Internet site, said additional information being related to said program. For instance, if the program contains a musical performance, it maybe desirable to offer for sale to the user a  
25 video tape and/or a CD for the same performance. The address of the Internet site, providing this service and other related control information is stored in a memory 22. An encoder 24 is used to modulate the signals from the broadcast source 20 thereby superimposing on said signals the information from memory 22. A preferred modulation scheme in which the visible portion of a TV program is used to transmit information is disclosed in commonly  
30 owned co-pending application S.N. 09/046,413, filed March 23, 1998, entitled METHOD FOR TRANSMITTING DATA ON A VIEWABLE PORTION OF A VIDEO SIGNAL, now  
\_\_\_\_\_. Briefly, as described in said application, data is transmitted in the form of groups of data bits called symbols. Each symbol has associated with it one of a predetermined number of longer sequences of "chips" called PN sequences. The PN  
35 sequence transmitted for any symbol is divided into a multiplicity of lines of chips. Each line of chips is transmitted with its inverse, in pair-wise fashion, by embedding them in respective

pairs of line scans of the video signal. For example, each symbol representing 4 data bits may have associated with it one of 16 PN sequences of 80 chips each. Any such PN sequence that is to be superimposed on the video signal is divided into 4 lines of 20 chips each. Each line of chips is transmitted in its normal form and with its inverse, so that 8 lines  
5 of 20 chips each are added to or subtracted from respective line scans of the video signal.

Received pairs of line scans are operated upon to extract the 20 chips that they represent. This is done by subtracting one line scan from the other in order to minimize the effect of the video, and by integrating the difference signal for the duration of each chip. Because each chip in the original PN sequence is added to one line scan and subtracted from  
10 the other, when one line scan is subtracted from the other not only is the video effect minimized, but the magnitude of the chip amplitude is doubled. After all 80 chip pairs are processed in this way to derive 80 "integrated chip values," the received code is correlated with each of the 16 possible PN sequences for a best match. The symbol that was transmitted is deemed to be that one whose PN sequence has the highest correlation with the received  
15 code.

Returning now to Fig. 1, the modified broadcast signals are transmitted to tower 18 which sends them out to the various customers. At the user's site, the modified signal is received by control box 14 and the information superimposed by encoder 24 is decoded. In response, the control box 14 modifies the signals transmitted to the set 12 to display an  
20 indication to the user that additional information regarding the current musical performance may be obtained from an Internet site.

The user site also has a telephone hand set 26. Preferably set 26 is a wireless telephone set which is coupled to a base 28 by an RF link. Alternatively, the telephone hand set 26 may be connected by a standard wire to base 28. Base 28 and hand set 26 cooperate  
25 to provide standard telephone communication over a telephone line 30. In addition, these units further cooperate to provide a means of accessing the Internet site designated by the control box 14 as follows.

As previously mentioned, initially when additional information is available, the control box generates an appropriate indication on set 12. For example, this indication may  
30 be a blinking colored square in the upper left hand corner of the set. The user can elect to operate a control button on hand set 26 ( as described in more detail below) which turns the hand set 26 into an Internet controller. If the user now desires to access the additional information, he operates this button and the set transmits a signal to control box 14 via base 28. In response, the control box 14 transmits to the base 28 the address of the relevant  
35 Internet site. The base uses line 30 to dial up an ISP 32. The ISP 32 provides access to the relevant Internet site 34.



Site 34 includes a web server 36, a data 38 and a data management system 40. In response to the request from base 28, the site 34 sends data descriptive of its web pages. This data is transmitted by base 28 to control box 14. In response the control box displays the web pages on the set 12 either by replacing the normal video picture received from the broadcast tower 18 or by superimposing the same on a part of the picture. In this manner the user can access the site 34 and if he so desires, he can order merchandise displayed on the web pages using the standard Internet protocol.

Referring now to Figs. 2 and 3, the telephone hand set 26 has a housing 40 with a front face 42 and a back face 44. Extending outwardly of the housing is an RF antenna 44 for communicating with base 28. Disposed on front face 42 there is a standard keypad 46 and a display window 50 on which various messages and information may be displayed. The set 26 may also be provided with additional control buttons 52 for generating commands associated with the operation of the set 26 as a telephone.

On back face 44, set 26 includes a plurality of buttons 54 individually designated in Fig. 3 as 54A through 54F) used to operate the set for accessing the Internet site in case of an interactive event. This term is used in the present application to denote a TV program associated with a specific web page. As seen in Fig. 4, in addition to the elements described above, the set 26 further includes a digital encoder/decoder 56, an RF modulator 58, an earphone 60 and a microphone 62. For normal telephone operation, a user dials a number using keypad 48. As the numbers are dialed the digital encoder 56 generates a corresponding DTMF code which is sent to RF modulator 58 for transmission to the base 28. When the control buttons 52 are activated, corresponding control signals are generated by encoder 56 and sent by the RF modulator 58 as well. The dialed numbers and other information is displayed on display 50.

Speech is transmitted from the microphone 62 to the modulator, and received signals are sent from the modulator to the earphone 60. The operation and structure described so far is generic to wireless telephone hand sets.

The digital encoder/decoder 56 however is modified so that the activation of the Internet keys 54 is also sensed and corresponding signals are sent to the base 28 as well, as discussed in more detail below.

In Fig. 5 an alternate embodiment is shown wherein the front face 42A is provided with keyboard 48, control keys 52 as well as Internet control keys 54.

Referring now to Fig. 6, the telephone base 28 includes a microprocessor 60, a modem 62, a multiplexer 64, a telephone connection terminal 66, a telephone control circuit 68 and an RF modulator 70. The base 28 further includes a keyboard interface 72, a parallel interface 74, a smart card interface 76, an RF transceiver 78 and a serial port 80.

Starting first with normal telephone communications, signals from the telephone hand set 26 are received from RF modulator 70. These signals are transmitted to the telephone control circuit 68. These signals are converted into standard signals compatible with telephone lines. The signals are then transmitted through multiplexer 64 to the telephone connector 66 to standard telephone wire 30.

As mentioned above, an interactive event is first indicated on set 12 by box 14. When the user desires to access a particular web page related to a program he is watching on set 12, he activates one of the Internet control buttons 54, such as 54 F. When signals indicative of this activation are received by the base 28, they are sent by modulator 70 to the microprocessor 70. The microprocessor 70 then initiates an interactive transaction mode during which the user can access the web page and perform functions generally associated with the Internet. During this time, the standard telephone functions may be disabled. In the interactive mode, signals are sent to and received from control box 14 via RF transceiver 78. Signals to and from ISP 32 are exchanged using the modem 62. For this purpose, the multiplexer 64 is set to connect the modem 62 to the telephone connector 66. The smart card interface 76 may be used to debit the user's card when he makes a purchase, if the Internet site is set to allow this type of operation. Various information may be printed on a printer 82 via parallel interface 74. Additional commands and information may be entered by the user on keyboard 84 via keyboard interface 72. Other information may be entered into the system using the serial interface 80 and an appropriate device connected thereto.

Referring now to Fig. 7, the control box 14 includes a microprocessor 90, a transceiver 92, a video input 94, a video output 96, a two-position video switch 98, a summer or combiner 102, a memory 104 and a graphic generator 106. Fig. 8 shows a general flow chart for the system and the operation of the control box 14 is best described in conjunction with this flow chart.

Normally switch 98 is positioned as shown in Fig. 7 so that the video signals from the video input are transferred straight to the video output 96. During this time normal, unmodified TV signals are received and displayed by set 12. The signals are also monitored by the decoder 100 which searches for signals indicative of an interactive event (i.e., an indication from the encoder 24 of additional information defining a web page). When such a signal is detected (step 200), the decoder sends a corresponding signal to the microprocessor 90. The microprocessor 90 changes the position of switch 98 and retrieves a predetermined symbol or message from memory 104. This symbol is fed to a graphic generator which generates a graphic symbol or element corresponding to the information in memory 104. This symbol is fed to a summer or combiner 102 which combines the current standard TV program with this symbol. The output of the summer 102 is fed through the

switch 98 to the RF output 96 and is displayed by the set 12 (step 202) thereby indicating to the user that a web page related to the current program is available for viewing. Next, the microprocessor 90 monitors (step 204) the connection to base 28 for commands from the user. If no such signal is received within a predetermined time (for instance 10 seconds) it is assumed that the user does not want to see the web page (step 206). Therefore in step 208 switch 98 is reset and the standard TV program continues.

If the user indicates that he does want to see the web page by depressing for example the 'service button' 54F, (which action is transmitted from the hand set 26 to the base 28 and then to the control box 14) then in step 212 the microprocessor decodes and send (step 214) the URL of the web page to the base 28. In step 216 the microprocessor 90 retrieves a standby message and in step 216 the standby message is displayed to indicate to the user that the operation of accessing the Internet and retrieving the requested web page has started.

The microprocessor 60 in base 28 generates the required signals for accessing the ISP 32 and send the signals through modem 62. During this process the standard telephone functions are disabled. The request is accepted by the ISP 32 and in response the ISP retrieves the web page signals from server 36 and sends them back to base 28. The base 28 then sends the signals on to the microprocessor 90 in control box 14.

The microprocessor 90 waits for a predetermined time for the web page information from base 28. If the information is not received within set time (step 218) then in step 220 an error message is displayed on set 12 (step 220), the switch 98 is reset and normal operation is resumed. If the web page information is received in time, the microprocessor provides it to graphic generator 106. The web page is then finally displayed on the set 12 (page 224). In this manner, once the URL is received, the base 28, box 14 and hand set 26 cooperate to gain access to the web page using the dial-up Internet connection to obtain and display the designated web page.

Once the web page is displayed, the user can choose to perform other functions normally associated with the Internet (step 224) such as including downloading text (which may be printed on printer 82), viewing other pages linked to the original web page and so on.

One desirable function is to allow the user to chose and buy a product from the web site. For this purpose, the user may use the Internet control keys 54. Payment may be made either by entering a credit card number either through the keypad 48 or an external keyboard 84. Alternatively, if a smart card system is in place, the user may insert his smart card into the smart card interface 76. The microprocessor 60 then checks the amount available on the smart card, if the amount is sufficient, it may deduct the appropriate amount from the smart card and send a message to the server 36 indicating that a proper payment has been made.

The microprocessor 90 monitors the activity on the Internet connection (step 226). Once this connection is terminated, the switch 98 is returned to its initial position and the viewing of the standard programming is resumed.

5 The flow chart of Fig. 8 shows the general steps performed by the system in order to allow a user to gain access to a web page or several web pages associated with an interactive event. The remaining flow charts provide a more detailed description of the operation of the various elements of the system. Starting with Fig. 9, a typical sequence of sending data from the control box 14 to base 28 (and telephone hand set 26) is described. Starting with step 250, the microprocessor 90 polls the telephone hand set 26 at regular intervals using an  
10 internal timer. In step 250, a check is performed if the timer has timed out and hence it is time to check on the set 26. If the timer has timed out, in step 252 a poll signal is sent to the base 28. In step 254 the microprocessor 90 waits for a response from base 28. If no response is received, in step 255 a 'telephone not responding' flag is set and the loop returns to step 250. If an answer is received in step 254 then in step 256 a check is performed to insure that  
15 the response is complete. In step 258 a check is performed to determine if the response is a correct answer to the poll. If it is not, then in step 260 a check is performed to determine if the base 28 has been polled at least N times where N is a programming variable. If it has not, then in step 262 a REPOLL signal is sent to base 28 and the loop continues to step 254 discussed above.

20 If in step 260 the base 28 has been polled N times then the loop continues to step 255.

If in step 258 the response was appropriate then in step 264, the microprocessor 90 unpacks data received from the broadcasting antenna and stores it in a buffer. Following step 264 the loop returns to step 250.

25 If it is not time to poll the base 28 then in step 266 a check is performed to determine if there is any data in the buffer to be sent to the base 28. If there is, then in step 268 the data is packed or other wise formatted for the base 28 in step 270 the data is sent.

30 In step 272 a check is performed to determine if the base 28 has returned any messages within a predefined time period after step 270.. In step 274 a check is performed to determine if the base 28 has received the complete data. If not then in step 276 a check is performed to determine how many tries have been made to send the data. If it was not resent more than for instance three times, then in step 280 the message is resent. Otherwise the loop recycles to step 255.

35 If in step 274 the base 28 indicates that it has received the complete message then in step 276 the microprocessor 90 clears the message buffer and is ready to receive and transmit more messages.

The operation of the base 28 is shown in Fig. 10. Starting with step 300, the base 28

checks for a message from the control box 14. When a message is received, in step 302 a check is performed to determine if the message is complete. If the message is not complete, in step 304 a test is performed to determine if there is sufficient data in received message to identify it. If there is sufficient data, then a response is sent to the control box 14 indicating that the message was incomplete (NACK) in step 306. Otherwise no response is sent.

If a complete message is received, then in step 308 a test is performed to determine if the received message was a POLL. If not, then in step 310 a test is performed to determine if the message is data. If it is then the message is stored in a buffer in step 312 and an acknowledge message is sent in step 314 to the control box 14.

If in step 310 the message is not recognized as data then in step 316 a message is sent to indicate that the received message is an unknown request.

If in step 308 a message is recognized as a POLL message, then in step 318 a test is performed to determine if there is data to be sent. If there is data to be sent then in step 320 the data is retrieved from the local buffers. In step 322 a response is generated indicating that a POLL has been received and (if applicable) that data is incorporated into the message.

In step 324 the message is sent to the control box 14.

In step 302 if a complete message is received a further test is performed in step 326 to determine if the received message is a REPOLL, that is, a repeat of an unsuccessful POLL. In case of REPOLL, the response to the last POLL message is repeated in step 328. If the received message is not recognized as a REPOLL, the message sent in response to the last message is discarded and the loop continues to step 308.

The operation of the hand set 26 is shown in Fig. 11. Starting at step 340, after each data message exchange or voice communication, the set 26 is set to an inactive state. In step 342 a check is performed to detect if a message indicative of an interactive event is sensed. If not, in step 344 a check is performed to determine if an interactive key has been pressed by the user (i.e., one of the keys 54, indicating an Internet command). If not, in step 346 a check is performed to determine if the standard telephone voice mode 'turn on' key has been pressed. This key is usually labeled the 'talk' or 'phone' key on standard cordless telephone handsets. If not, the loop continues to step 342.

When an interactive event message is received, then in step 348, the set 26 is set to an interactive state. In step 350 a check is performed to determine if one of the keys of keyboard 48 has been pressed. In step 352 the interactive key state is checked. In step 354 a key code is sent to the control box indicating which key has been activated. In step 356 a check is performed to determine whether the 'talk' key is depressed.

If not then in step 358 a check is performed to determine if a command has been received from the control box 14. If a command has been received, in step 360 a check is

performed to determine if this command is an 'END command' indicating the end of an interactive event. If it is then the loop continues to step 340. If not then the command is executed in step 362.

5 In step 346 if the 'talk' key is depressed, the telephone is set to a voice mode and standard telephone communication is allowed until the hand set is hung up (steps 366, 368).

It is contemplated that data exchange may occur by using other venues as well. For example, in an alternate embodiment, instead of an RF connection, a hard wired, an infrared or an ultrasonic connection can be provided between the telephone base and the control unit with substantially no changes in the protocol outlined above.

10 In another embodiment, the telephone base and the control box could be combined into a single unit, disposed, for instance, in the TV set. The telephone hand set would operate just as described above, however, there would be no need for a special protocol between the telephone base and the control box.

15 In a further embodiment, the control box communicates directly with the modem within the telephone base. For this embodiment, two rf connections are contemplated; one for between the control box and the mode and the other between the control box and some of the other components of the base, such as the smart card reader, the printer, and so on.

Obviously numerous modifications may be made to the invention without departing from its scope as defined in the appended claims.

20

We claim:

1. A system for transmitting television programs to a plurality of customers, and additional information associated with said programs, said system comprising:

5 A. a broadcasting station receiving and transmitting a broadcast signal including a standard TV program and an indication signal indicative of additional information related to said TV program; and

B. a receiver station including

10 (I) a control box receiving said signal and including a detector for detecting said indication signal and a display generator for generating a display indicative of said indication signal;

(II) a TV set that displays said TV program and said additional information; and

(III) a telephone station having the dual purpose of providing a standard telephone communication and controlling the display of said additional information on said TV set.

15 2. The system of claim 1 wherein said receiver station further includes an Internet access member that provides Internet access, said additional information being retrieved by said station using said Internet access.

3. The system of claim 2 wherein said telephone station includes a modem and a controller selectively activating said modem to retrieve said additional information.

20 4. The system of claim 3 wherein said telephone station includes select elements activated by a user to request said additional information when said display is generated.

5. The system of claim 4 wherein said display is visible on said TV set.

6. A TV receiver and display station for displaying a TV program having imbedded therein a additional signal indicative of additional information related to said program, said station comprising:

25 a control box receiving said video signals, said controller including a detector that detects said additional signal and an indication generator generating a display indicative of additional information being associated with a specific TV program; and

a telephone station associated with said control box and including a hand set for normal telephone communication;

30 said telephone station and said control box cooperating to provide in the presence of said additional signal access to said additional information using a standard telephone line and to display said additional information.

7. The receiver of claim 6 wherein said telephone station and said control box cooperate to retrieve said additional information using an Internet access.

35 8. The receiver of claim 7 wherein said telephone station includes a selector element operated by a user to request the retrieval and display of said additional information.



9. The receiver of claim 8 wherein said telephone station includes a telephone base and a remote hand set.
10. The receiver of claim 9 wherein said telephone base and set remote hand set are in wireless communication.
- 5 11. The receiver of claim 7 wherein said telephone station includes a modem and a selector element for selectively activating said modem.
12. The receiver of claim 7 wherein said telephone station includes an address receiver for receiving and address of an Internet site related to said program, said telephone station using said modem in response to an information request to access the Internet site designated said address to retrieve said additional information.
- 10 13. The receiver station of claim 7 wherein said control box includes a combiner for combining said TV program with said additional information whereby said additional information can be displayed on a TV set.
14. The receiver station of claim 13 wherein combiner superimposes said additional information on said TV program.
- 15 15. A method of displaying information related to a standard TV program comprising:  
transmitting to a receiver station a video signal containing tv signals associated with said standard TV program and an additional signal indicative of the presence of said additional information, said additional signal being imbedded in said video program;  
20 detecting at said receiver station said indicative signal;  
selectively retrieving said additional information; and  
causing said standard TV program and said additional information to be displayed.
16. The method of claim 15 wherein said additional signal includes an Internet address, and wherein said step of retrieving includes accessing said Internet site and retrieving said information from said Internet site.
- 25 17. The method of claim 16 wherein said Internet site is accessed using a telephone connection.
18. The method of claim 15 further comprising generating a display for a user indicative of the availability of additional information, and in retrieving said additional information in response to a request by said user.
- 30 19. The method of claim 15 further comprising transmitting said additional signal as part of a visible portion of said TV program.



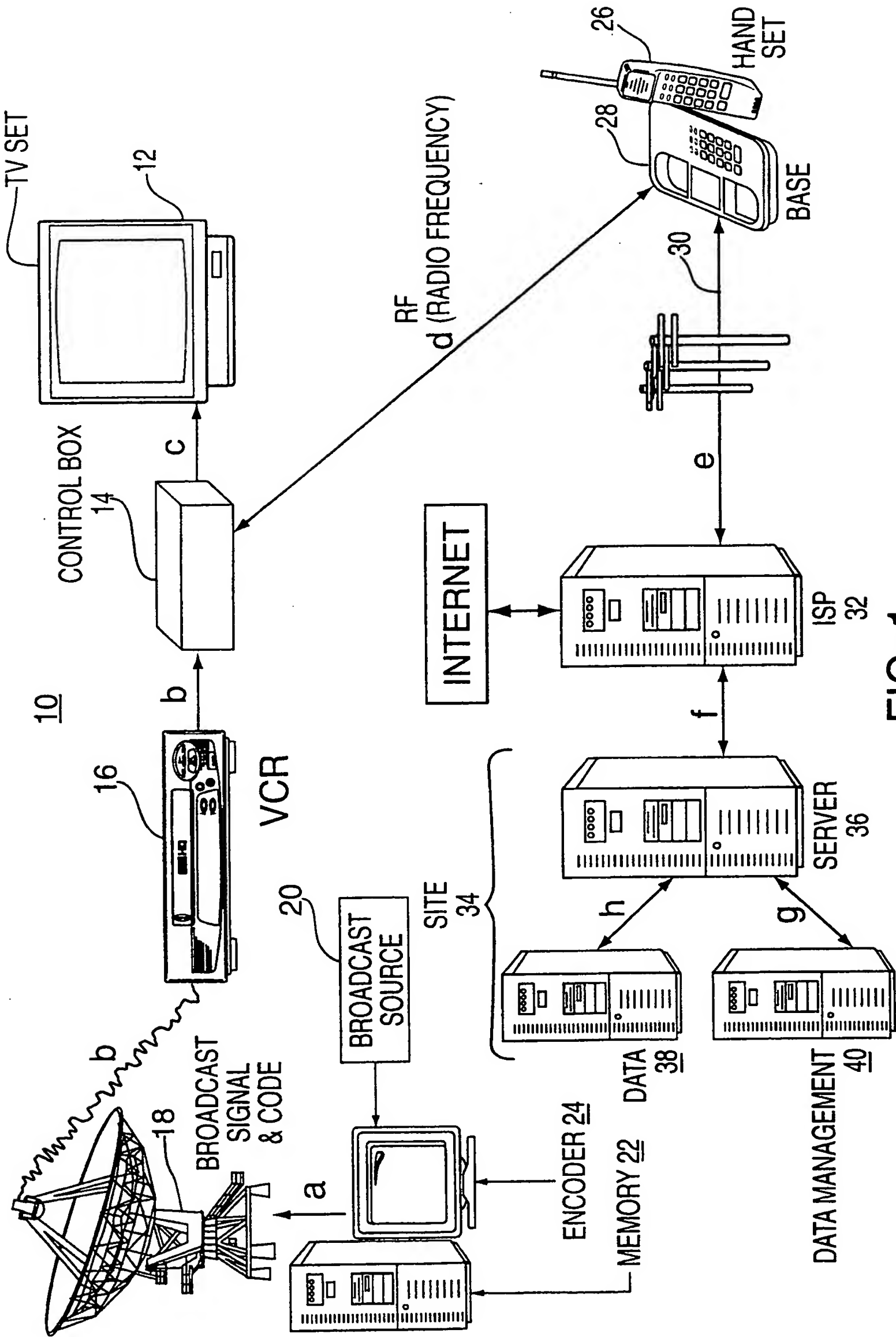


FIG. 1

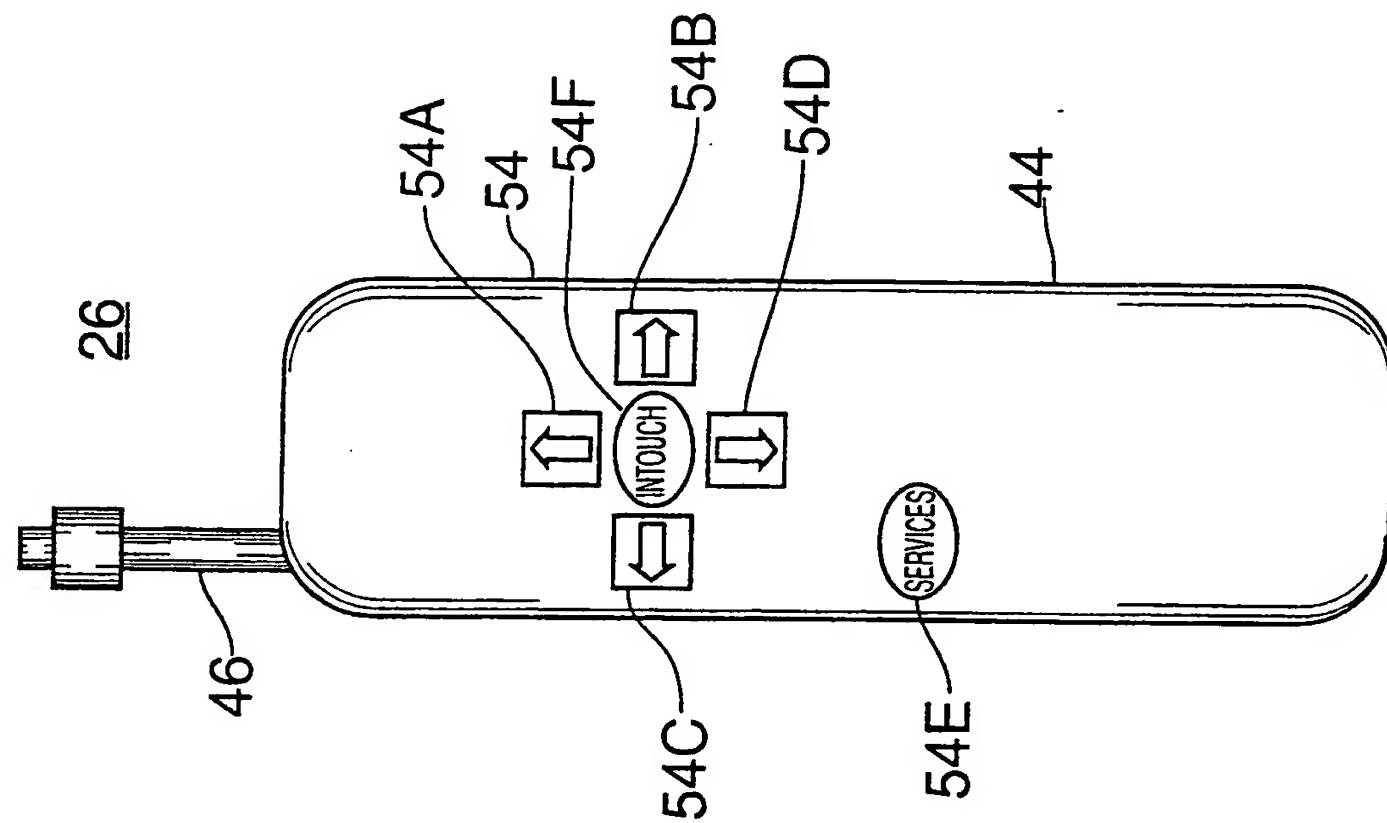


FIG. 3

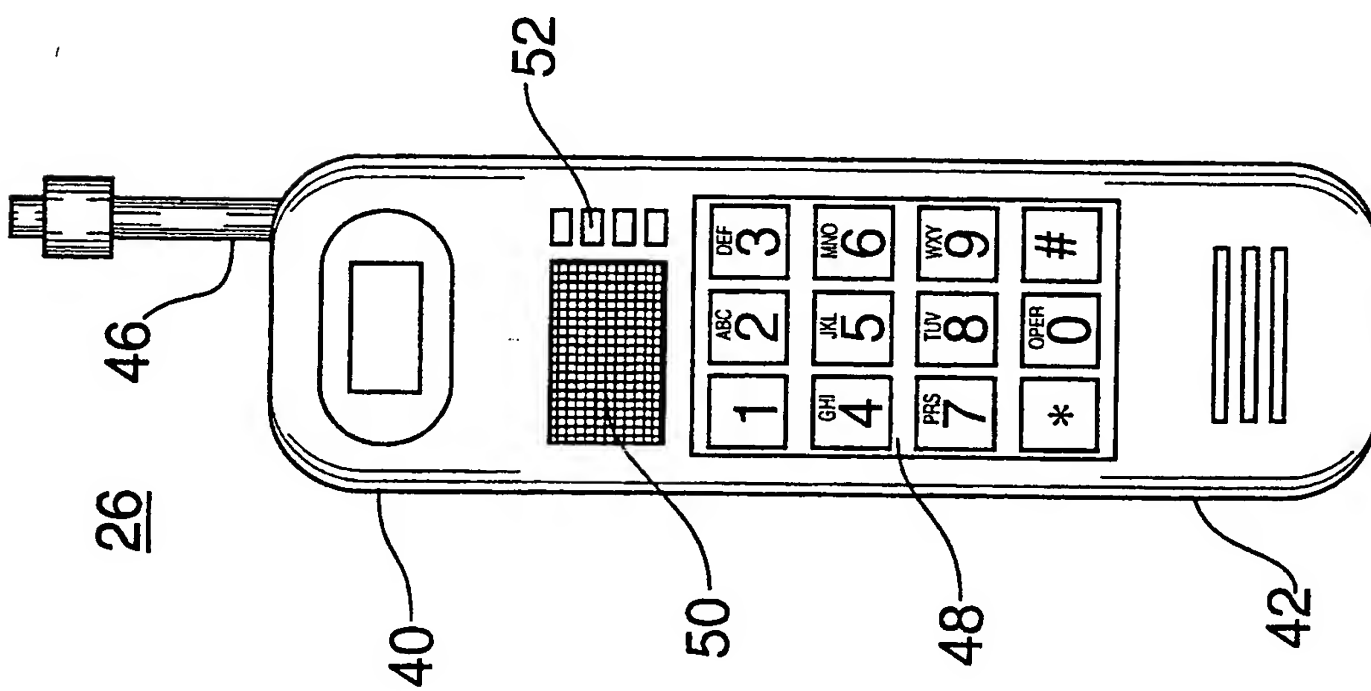


FIG. 2

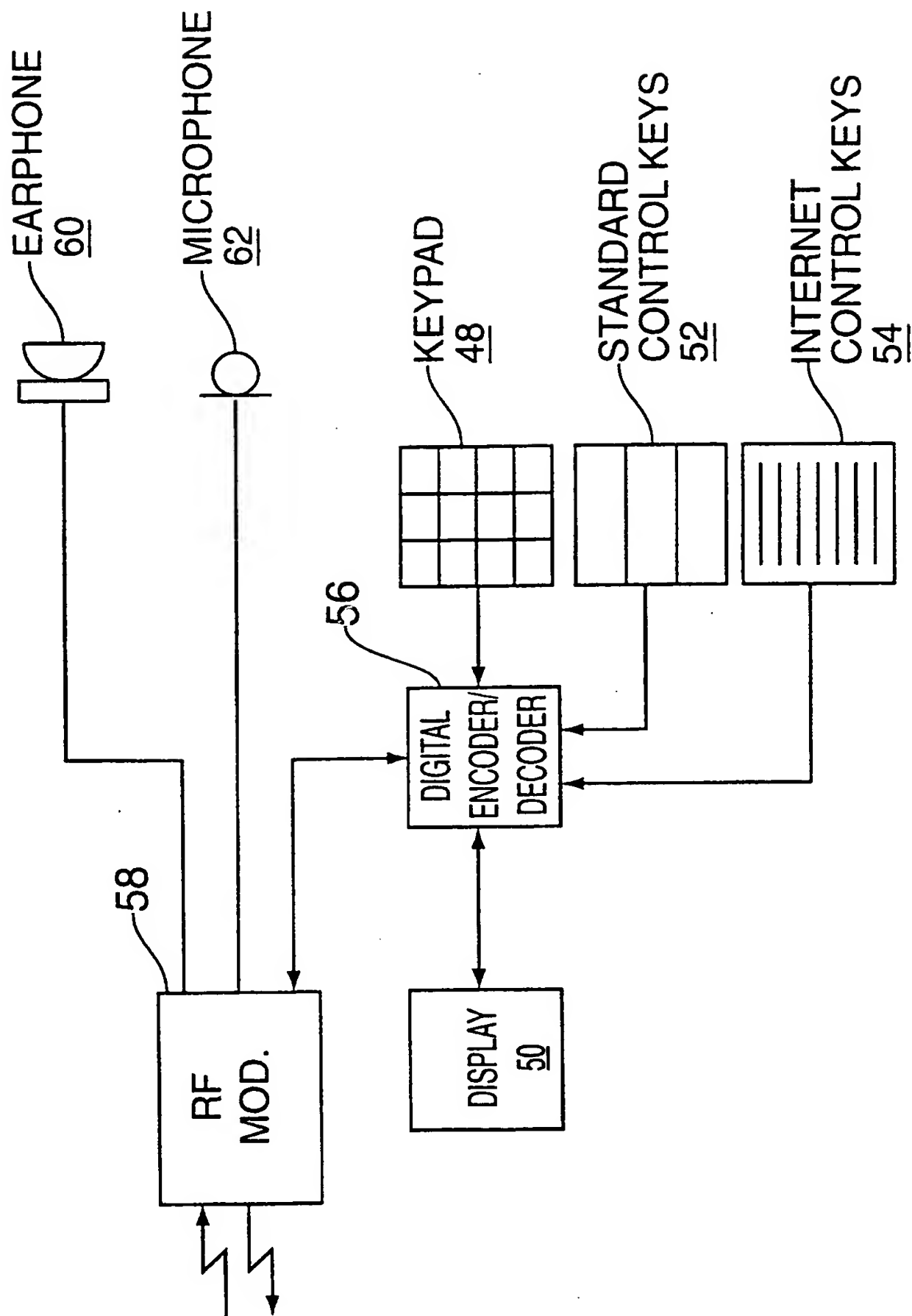


FIG. 4

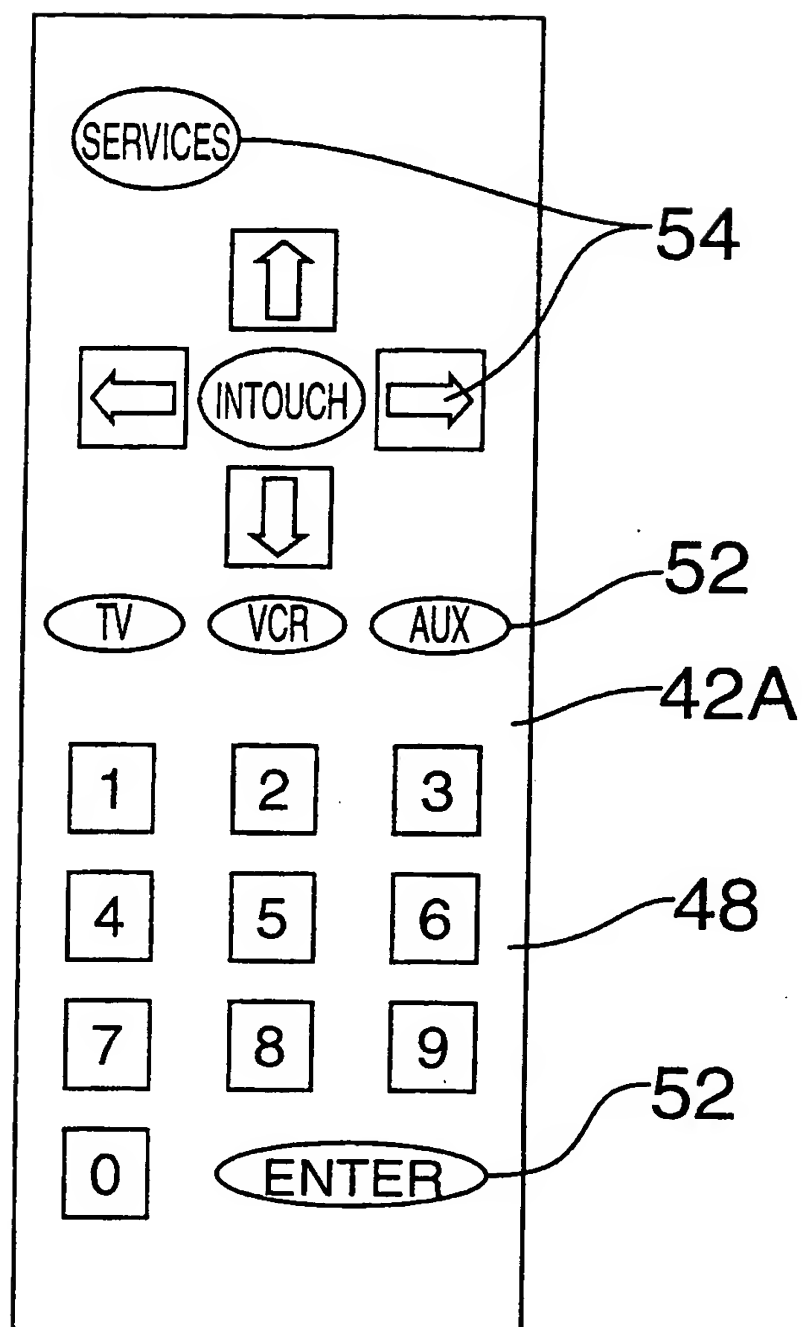


FIG. 5

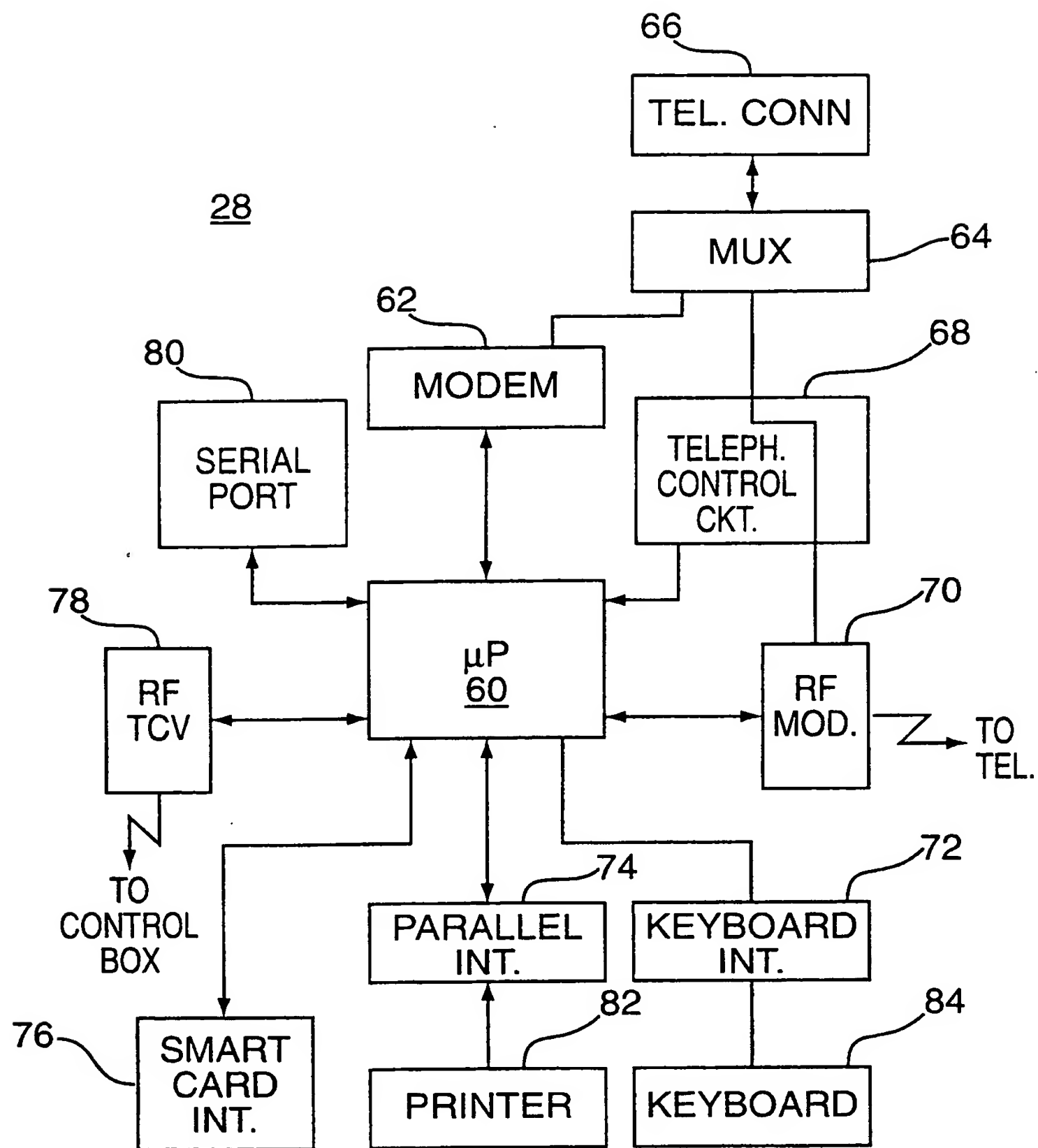


FIG. 6

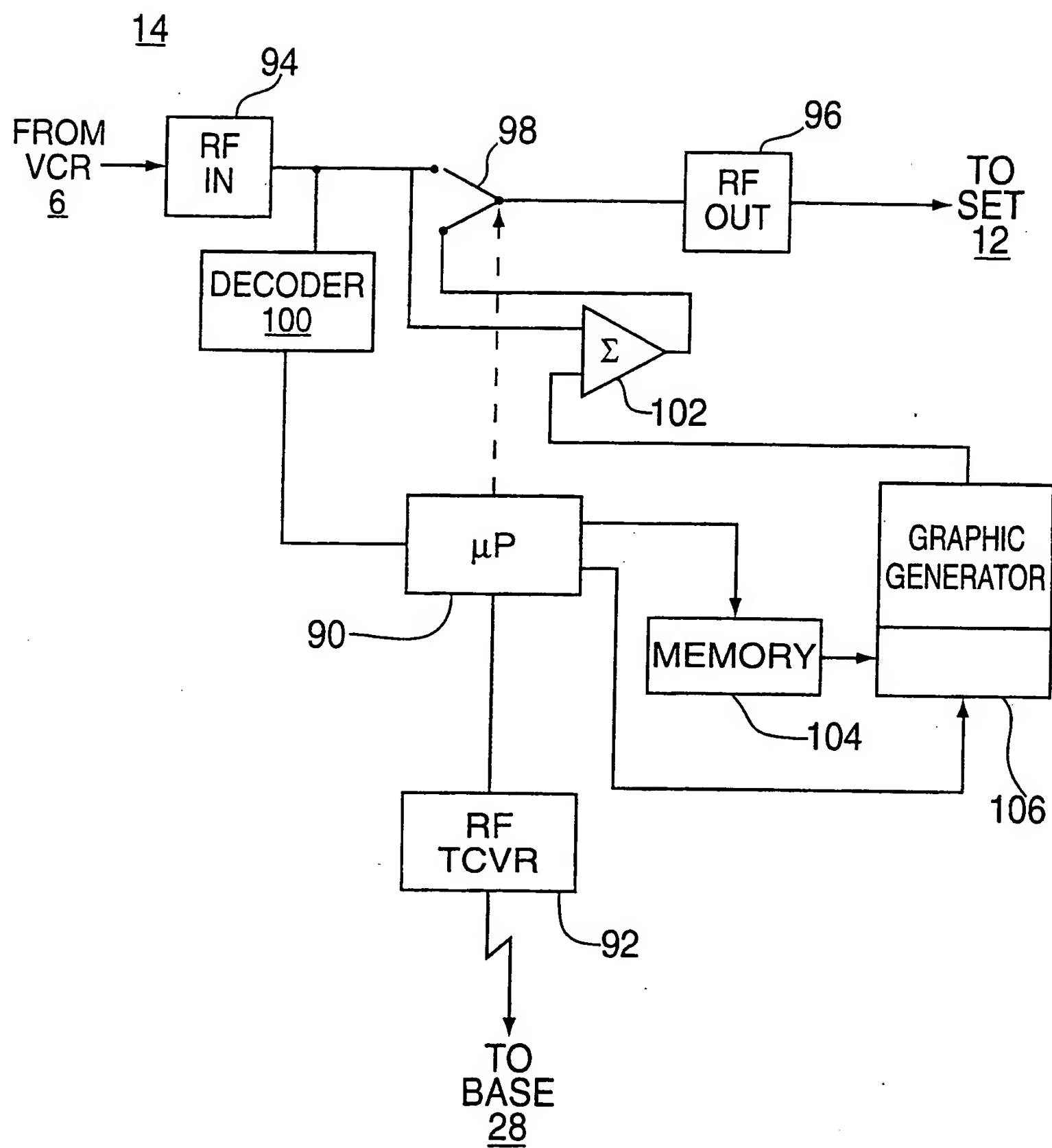


FIG. 7

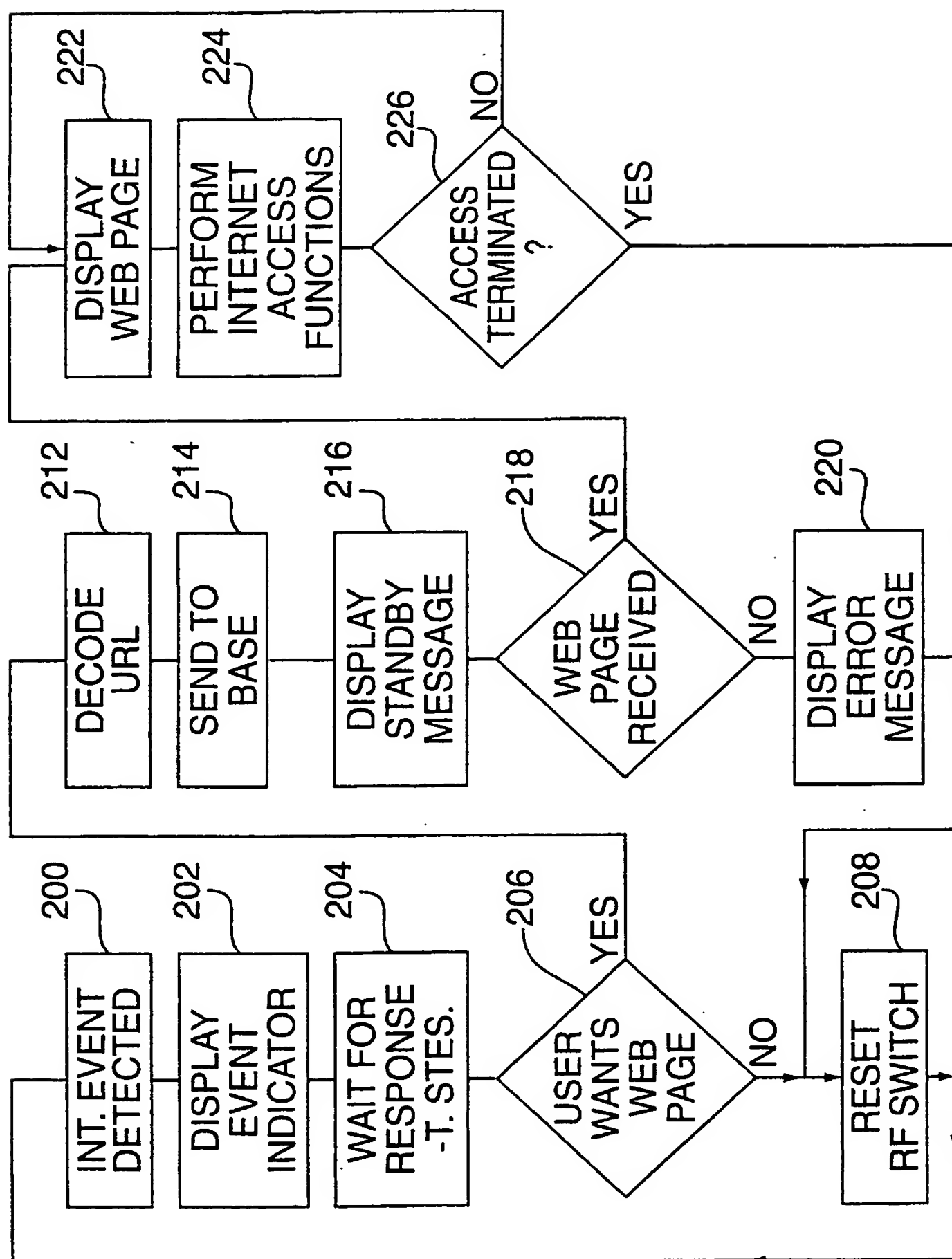


FIG. 8

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/22844

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :Please See Extra Sheet.

US CL :Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, 5,671,267 A (AUGUST et al) 23 SEPTEMBER 1997; col. 2, lines 28-45; col 2, line 56 through col. 4 line 15; col. 4, lines 26-33; col. 9, lines 57 through col. 10, line 2; figure 2, col. 6 line 58 through col. 7, line 15; col 2, lines 28-55; col 9, line 57; col.6 line 58 through col. 7 line 15; figure 3, col. 5, lines 28-39; col. 5, lines 34-40; col.4 lines 20-27; col. 4, line 5 through col. 5, line 54; col 6, line 58 through col. 7 line 15.	10-16, 18, and 32-34
Y		1-9, 17, 19-31 and 35-36
Y	JP, 55-140371,B (NUBUYUUKI), 01 NOVEMBER 1980, see constitution section.	1-9, 19-31 and 35-36
Y	US, 5,343,239 A (LAPPINGTON) 30 AUGUST 1994; see col. 6 line 67 through col. 9, line 44; col. 15, line 45 through col. 17, line 52	27

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

03 MARCH 1999

Date of mailing of the international search report

04 MAY 1999

Name and mailing address of the ISA/US  
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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/22844

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, 5,228,077 A (DARBEE), 13 JULY 1993; See col. 2, lines 7-40; col.18, lines 41-57; col. 19, line 62 through col. 20, line 55.	24
Y,P	US 5,761,606 A (WOLZIEN), 02 JUNE 1998, see col. 2, lines 22-67.	7
Y	US 5,497,186 A (KAWASAKI) 05 MARCH 1996; see col. 3, lines 4-28, col. 3 lines 55-67; col. 4 lines 22-51; col. 5, lines 4-32; col. 4 lines 4-21.	5-6, 8 and 12-18

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/22844

## A. CLASSIFICATION OF SUBJECT MATTER:

IPC (6):

H 04 N 7/10; H 04 N 7/01; H 04 N 7/00; H 04 N 5/44  
H 04 H 1/00; H 04 H 1/02; H 04 H 7/00  
H 04 M 11/00;  
G 06 G F 17/60

## A. CLASSIFICATION OF SUBJECT MATTER:

US CL :

348/9; 348/10; 348/12; 348/13; 348/460; 348/552; 348/734;  
455/3.1; 455/4.1; 455/4.2; 455/5.1; 455/6.1; 455/6.3  
379/90.01; 379/93.12; 379/93.17; 379/93.23; 379/93.25; 379/102.02; 379/102.03

## B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

348/9; 348/10; 348/12; 348/13; 348/460; 348/552; 348/734;  
455/3.1; 455/4.1; 455/4.2; 455/5.1; 455/6.1; 455/6.3  
379/90.01; 379/93.12; 379/93.17; 379/93.23; 379/93.25; 379/102.02; 379/102.03